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Nothapodytes amamianus (Icacinaceae), a New Species from the Ryukyu Islands

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A new species, *Nothapodytes amamianus* Nagam. & Mak. Kato, is described from Amami-oshima, the Ryukyu Isls., and information on its pollination biology is presented. *Nothapodytes amamianus* is closely related to *N. nimmonianus* (J. Graham) Mabb., which is widely distributed from S. India to the Ryukyus (Yaeyama group), but is distinguished from the latter by the base of the leaves truncate or shortly cordate, the larger flowers with petals 7-9 mm long, and the short but prominent anther connective. This new species is restricted to a small area on Amami-oshima and should be categorized as critically endangered. A key to the Japanese species of *Nothapodytes* is provided.

Key words: Amami, Icacinaceae, *Nothapodytes*, pollination, Ryukyu Islands

Nothapodytes Blume comprises about 10 species of small trees and shrubs distributed in India, Ceylon, Indochina, Malesia, S. China, Taiwan and the Ryukyus (Sleumer 1971, Hsuan 1981, Kostermans 1982, Villiers 1985).

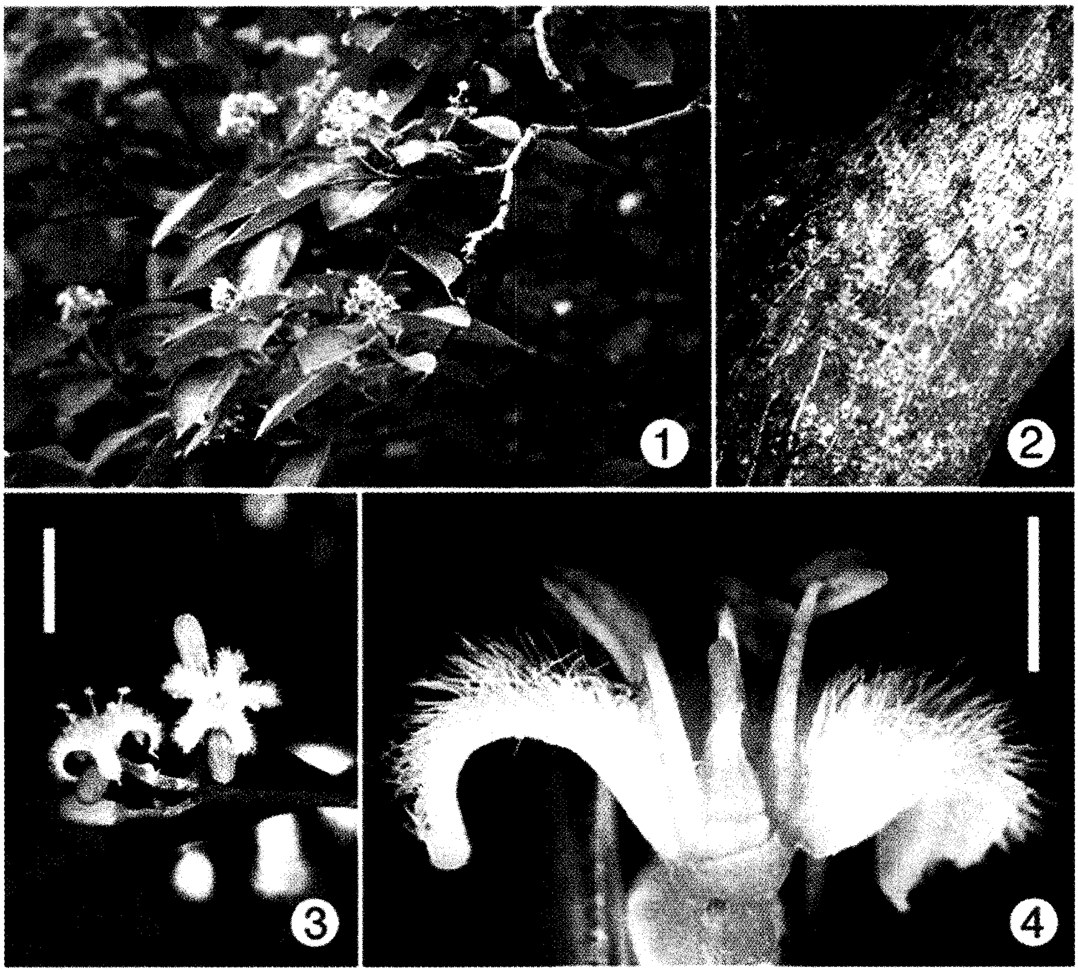
In Japan, only *Nothapodytes nimmonianus* (J. Graham) Mabb. (synonym *N. foetidus*(Wight) Sleumer) which has the widest distribution in the genus, has long been known from Ishigaki and Iriomote islands in the Yaeyama group of the Ryukyu Islands. Hatusima (1986) reported *N. nimmonianus* (as '*foetida*') from Naon on Amami-oshima and the Kagoshima Red Data Book (Kagoshima Prefecture 2003) added Tokunoshima as another locality.

Examination of flowering material of *Nothapodytes* from Naon, Amami-oshima, led us to the conclusion that this plant represents an undescribed species distinct from *N. nimmonianus* in the Yaeyama group. This plant is most closely related to *N. nimmonianus* in sharing conspicuously angled twigs and longer petioles, but is distinguished by the larger leaves with the base truncate or shortly cordate, larger flowers, and a short but prominent anther connective. The plants reported from Tokunoshima are uncertain because we have not seen specimens of them.

Nothapodytes amamianus Nagam. & Mak. Kato, **sp. nov.**—Figs. 1-6.

Haec species nova *Nothapodytes nimmoniano* (J. Graham) Mabb. affinis, sed a quo foliis basi truncatis vel breviter cordatis, floribus majoribus cum petalis 7-9 mm longis, et antherae connectivo breviter prominente differt.

Typus: JAPAN, Kagoshima Pref., Oshima-gun, Amami-oshima, Yamato-son, Naon, 10-30 m alt., 16



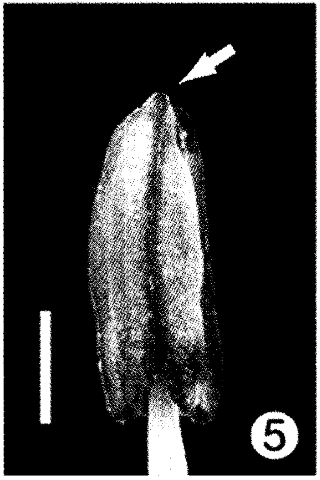


FIG. 1-5. *Nothapodytes amamianus* Nagam. & Mak. Kato. (*Mak. Kato s.n.*, 12 May 2002). 1. Flowering branches. 2. Bark. 3. Flowers. bar = 1 cm. 4. Flower in lateral view, petal removed to show nectary disc and ovary. bar = 3 mm. 5. Anther with short but prominent connective (arrow). bar = 1 mm.

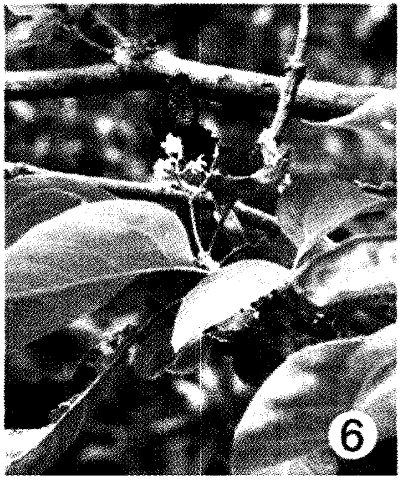


FIG. 6. Butterfly (*Byasa alcinous loochooana*) visiting flowers of *Nothapodytes amamianus* (*Mak. Kato s.n.*, 16 May 2003).

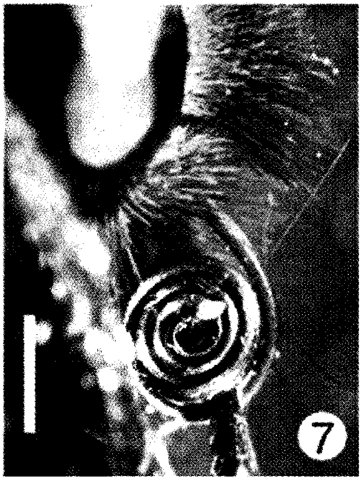


FIG. 7. Pollen grains of *Nothapodytes amamianus* on proboscis of *Byasa alcinous loochooana*. bar = 1 mm.

May 2003, *Mak. Kato s.n.* (KYO).

Small tree, to 10 m tall. Bark grayish brown, smooth or shallowly longitudinally fissured. Branchlets grayish brown, conspicuously angled, sparsely appressed hairy but soon glabrescent, leaf scars and straw-colored lenticels scattered. Buds hemispherical, with several scales; scales ovate, rounded at apex, densely cinnamon tomentose. Leaves simple, estipulate, spirally arranged; blade coriaceous, oblong, ovate or orbicular, 8-23 cm long, 6-13 cm wide, base truncate or shortly cordate, lobes often unequal, margin entire, apex shortly acuminate or obtuse, glabrous except midrib and nerves sparsely appressed hairy on both surfaces, lower surface with axillary tufts of hairs; midrib on upper surface raised, midrib on lower surface prominent; nerves 6-7 pairs, raised on both surfaces; reticulation fine; petiole 4-8 cm long, sparsely pilose. Inflorescences cymes, corymbosely arranged, terminal, 3-8 cm across, 4-10 cm long including peduncle; peduncle 2-6 cm long, peduncle and axes more or less flattened or angled, appressed hairy; pedicels ebracteate, 0-1 mm long. Flowers bisexual, articulate below calyx; calyx sparsely appressed hairy outside, ca. 1.5 mm long including 5 shallow teeth; petals 5, free to base, valvate in bud, white, reflexed in anthesis, oblong-linear, apex acute and inflexed, appressed hairy outside, lanate inside, 7-9 mm long, 2-2.5 mm wide; stamens 5, free to base; filaments 4.5-6 mm long, glabrous, slightly flattened; anthers versatile, longitudinally dehiscing, 2.5-3 mm long; connective short but prominent; disc cup shaped, fleshy, ca. 0.5 mm tall, shallowly crenulate, glabrous outside, with some hairs on edge and inside; ovary superior, 1-celled, symmetrical, ovoid, densely appressed hairy, 1-1.5 mm long, gradually narrowed to style; style 2.5-3 mm long, upper half glabrous; stigma obliquely truncate and slightly concave, green; ovules 2, apical, pendent. Fruit a drupe, ellipsoid, slightly flattened, with 2 blunt ridges, pubescent, 10×7×6 mm (one fruit from *M. Tabata s.n.*, but seed not developed).

Japanese name: Wadatsumi-no-ki (nov.)

Distribution: Ryukyus (Amami-oshima), endemic.

Other specimens examined: All specimens were collected from the same locality as the type. *M. Tabata s.n.* (KAG), 17 Sep. 1977 (young fruit); *M. Kobayashi 28228-6* (KAG), 28 Dec. 1984 (sterile); *Mak. Kato s.n.* (KYO), 12 May 2002 (flower); *A. Naiki 5334* (KYO), 16 Apr. 2003 (young flower); *A. Kawakita s.n.* (KYO), 7 June 2003 (young fruit with seeds).

TABLE 1. Insect visitors to flowers of *Nothapodytes amamianus*.

Order / Family / Species	Number of visits to inflorescence in 20 minutes	Pollen attachment	Part of body with pollen attached
Diptera			
Syrphidae			
Phytomia zonata	2	-	-
Calliphoridae			
Chrysomya pinguis	12	+	ventral part of body
Stomorhina obsoleta	3	-	-
Lepidoptera			
Papilionidae			
Graphium sarpedon nipponum	3	?	
Byasa alcinous loochooana	5	+	proboscis
Papilio helenus nicconicolens	2	+	proboscis
Lycaenidae			
Nacaduba kurava septentrionalis	1	?	
Danaidae			
Tirumala limniace	2	+	proboscis

Pollination biology

Insect visitors to the flowers of *Nothapodytes amamianus* were recorded on 16 May 2003. The flowers secreted nectar from the nectary disc. We recorded three species of diptera and five species of lepidoptera visiting the flowers (Table 1), all of which collected nectar. It was interesting that no bees visited the flowers, although many halictid bees (*Lasioglossum mutillum*) were visiting flowers on a tree of *Sapindus mukurossi* Gaertn. neighboring the trees of *Nothapodytes*. Pollen grains were attached on ventral parts of the body of the fly, *Chrysomya pinguis*, and the probosces of the butterflies, *Byasa alcinous loochooana*, *Papilio helenus nicconicolens* and *Tirumala limniace*. Young fruits were developing on these trees on 7 June 2003 (*A. Kawakita s.n.*), perhaps indicating that calliphorid flies and papilionid/danaid butterflies are the pollinators.

Habitat and conservation status

The distribution of *Nothapodytes amamianus* is restricted to a narrow area (about 1 ha in size) near the village of Naon. The site is located on a northern slope facing the sea on a gravelly deposit of shale near a streamlet. The site is covered by a unique forest dominated by *Sapindus mukurossi* and *Fraxinus retusa* Champ. ex Benth. and accompanied by the rare endemic species, *Ilex poneantha* Koidz. and *Acer amamiense* T. Yamaz. The plants of *Nothapodytes* are canopy or subcanopy, forest trees. We found only 6 mature trees and no seedlings of *Nothapodytes* in the forest. Since the species does not appear to be propagating itself, it should be categorized as critically endangered.

A Key to the Japanese species of *Nothapodytes*

1. Base of leaves widely cuneate to rounded; pedicels 1-2 mm long; petals 4-5(-6)×c. 1.5 mm, sparsely to densely pubescent inside; anthers 1-2 mm long, connective not prominent ....*N. nimmonianus*
1. Base of leaves truncate to shallowly cordate; pedicels absent or to 1 mm long; petals 7-9 ×2-2.5 mm, lanate inside; anthers 2.5-3 mm long, connective short but prominent ....*N. amamianus*

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